

AD-A197 787

DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCL		1b. RESTRICTIVE MARKINGS DDC FILE COPY	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) NMRI 86-93		7a. NAME OF MONITORING ORGANIZATION Naval Medical Command	
6a. NAME OF PERFORMING ORGANIZATION Naval Medical Research Institute	6b. OFFICE SYMBOL (if applicable)	7b. ADDRESS (City, State, and ZIP Code) Department of the Navy Washington, D. C. 20372-5120	
6c. ADDRESS (City, State, and ZIP Code) Bethesda, Maryland 20814-5055	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION Naval Medical Research & Development Command	8b. OFFICE SYMBOL (if applicable)	10. SOURCE OF FUNDING NUMBERS	
8c. ADDRESS (City, State, and ZIP Code) Bethesda, Maryland 20814-5044	PROGRAM ELEMENT NO. N/A	PROJECT NO.	TASK NO. WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) PAIN-ONLY DECOMPRESSION SICKNESS AFFECTING THE ORBICULARIS OCULI			
12. PERSONAL AUTHOR(S) B. L. Hart, A. J. Dutka, and E. T. Flynn, Jr.			
13a. TYPE OF REPORT journal article	13b. TIME COVERED FROM TO	14. DATE OF REPORT (Year, Month, Day) 1986	15. PAGE COUNT 3
16. SUPPLEMENTARY NOTATION Reprint: UNDERSEA BIOMEDICAL RESEARCH 1986 Dec;13(4):461-463			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)	
FIELD	GROUP	SUB-GROUP	
		DECOMPRESSION SICKNESS	
		BLINK REFLEX	
		FACIAL NERVE	
19. ABSTRACT (Continue on reverse if necessary and identify by block number)			
<div style="text-align: center;"> <p>DTIC</p> <p>ELECTE</p> <p>S D</p> <p>AUG 16 1988</p> <p>H</p> </div>			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION	
22a. NAME OF RESPONSIBLE INDIVIDUAL Rosemary Coskey, Information Services Division		22b. TELEPHONE (Include Area Code) 202-295-2188	22c. OFFICE SYMBOL ISD/RSD/NMRI

Pain-only decompression sickness affecting the orbicularis oculi

B. L. HART, A. J. DUTKA, and E. T. FLYNN, JR.

Hyperbaric Medicine Program Center, Naval Medical Research Institute, Bethesda, MD 20814-5055

Hart BL, Dutka AJ, Flynn ET. Pain-only decompression sickness affecting the orbicularis oculi. *Undersea Biomed Res* 1986; 13(4):461-463. A case is reported of a diver who experienced the onset of pain in the left orbicularis oculi muscle approximately 20 min after surfacing from an experimental dive. A careful neurologic examination disclosed no abnormality. The response of the orbicularis oculi muscle to stimulation of the facial nerve and the blink reflex were both normal as recorded with a clinical neurophysiologic recording system (Nicolet CA 1000). The pain resolved quickly with recompression, supporting a diagnosis of pain-only decompression sickness in this small facial muscle.

decompression sickness
blink reflex
facial nerve

The most common manifestation of decompression sickness is pain in or around large joints and muscles. This report describes an unusual case of pain-only decompression sickness (DCS) involving the orbicularis oculi muscle.

CASE REPORT

A 34-yr-old, experienced, male Navy diver made an experimental dive to 3.9 ATA for 60 min in the wetpot of a hyperbaric research chamber complex. The subject breathed a 65% N₂:35% O₂ mixture and used the USN Mark 1 diver's mask. Descent was at 2.3 atmospheres/min and ascent at 1.8 atmospheres/min. The only stops were a 10-s hold at 1.9 ATA to change from air to the nitrox mix on descent and vice versa on ascent. The mask fit comfortably and the subject had no difficulty equalizing ears or sinuses during the dive. Moderate work was performed by pedaling an exercise sled in 70°F water during the dive. Work was interrupted intermittently by brief rest periods. The subject was well-rested and had taken no medications or alcohol for at least 24 h before the dive. He felt well upon surfacing from the dive. Approximately 20 min after surfacing, he noticed a sensation of tightness, "like a sore muscle."

extending in a 1-cm band from the middle of the left supraorbital ridge to the outer canthus of the left eye. He reported immediately to a medical officer.

The subject appeared comfortable and in no distress. He complained of deep, mild pain superolateral to the left eye. The pain worsened with gaze to the right, which caused narrowing of the left palpebral fissure, and by voluntary contraction of the orbicularis oculi. The sore sensation lessened on leftward gaze. There was mild tenderness to palpation beneath the left lateral canthus on rightward gaze. The eye itself was not tender. Sensation to light touch and pinprick was normal over the face. Extraocular movement, pupillary size and reactivity, corneal reflex, visual acuity, peripheral vision, and facial muscle movement were normal. There was no diplopia. The remainder of the cranial nerve, motor, cerebellar, and sensory examinations were also normal. There was no tenderness in the areas of the frontal or maxillary sinuses. Small fasciculations were visible just below the left eye. These increased with rightward gaze. We observed the subject for approximately 3 h before initiating recompression because these symptoms were felt to be atypical for DCS. No other symptoms developed, and there was only a slight decrease in the "sore" sensation.

The responses of both orbicularis oculi to stimulation of the facial nerve were recorded using a Nicolet CA 1000 clinical neurophysiologic recording system. A motor response of 5 mV at 2.8 ms latency was recorded on both sides; this is well within the normal range. A blink reflex was recorded using the same system. The response of the left orbicularis oculi to stimulation of the left superior orbital nerve is shown in Fig. 1. The latency of the R1 response is 11.75 ms and the R2 latency is 41 ms, both normal values.

Oxygen recompression therapy to 2.8 ATA was initiated 3 h 15 min after the onset of symptoms. A marked improvement was noted at 1.3 ATA. Upon reaching 2.8 ATA, the subject reported that the pain was about half of its initial level. The fasciculations were no longer apparent. The tenderness lateral to the eye disappeared completely after 5 min at 2.8 ATA. Very mild soreness was still present on extreme rightward gaze. This faded over the next hour, and complete resolution of all symptoms occurred before leaving 2.8 ATA. A standard US Navy Treatment Table 6 was completed without incident. Examination of the subject after the treatment revealed no abnormalities.

DISCUSSION

Pain that became worse on stretching the muscle and was relieved when the muscle was relaxed, and tenderness to palpation over the insertion of the muscle, indicated

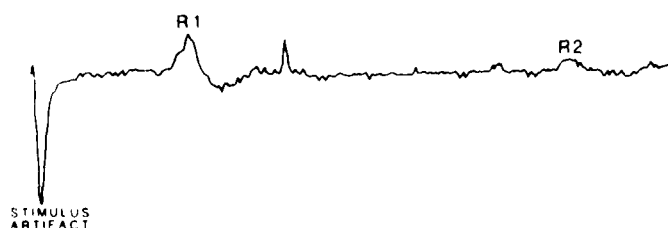


Fig. 1. Electrical response of the orbicularis oculi muscle to supraorbital nerve stimulation. R1 represents the immediate ipsilateral monosynaptic reflex and R2 is a delayed polysynaptic bilateral response. Total trace time is 50 ms; amplitude of the R1 is 2 mV. Normal response verifies that nerve function of the affected muscle is intact.



A-1 20

involvement of the orbicularis oculi muscle. The location of the pain also raised suspicion about the lateral rectus muscle, although the absence of diplopia argued against significant involvement of this muscle. A careful neurologic examination disclosed no abnormality. The absence of damage to the facial nerve branch to the orbicularis oculi was substantiated by the normal distal latency and amplitude of the motor response evoked by electrical stimulation at the angle of the jaw. The normal function of the afferent trigeminal nerve, brainstem interconnections, and efferent facial nerve was assured by the normal latency of the R1 and R2 components of the blink reflex. The R1 component is recorded ipsilateral to the stimulus only and probably represents a monosynaptic reflex arc. The later R2 response is a polysynaptic reflex with latency and ease of recording influenced by damage to the brainstem or descending corticobulbar tracts (1).

Decompression sickness most commonly involves the musculoskeletal system in the region of large joints. Although bubble formation is strongly implicated, the exact nature of the injury and even the location of the injury are unclear. The present case offers an example of localized injury in a small muscle. Neurologic DCS, a possibility of strong concern with the reporting of facial symptoms, was excluded. The orbicularis oculi muscle is an extremely unusual location for DCS; we are unaware of any previous reports of such an occurrence. However, the appearance of pain in a muscle shortly after a dive and its prompt response to recompression are consistent with mild, pain-only DCS.

The opinions and assertions contained herein are those of the authors and are not to be construed as official or as reflecting the views of the U.S. Navy Department or the naval service at large.—*Manuscript received for publication December 1985; revision received April 1986.*

Hart BL, Dutka AJ, Flynn ET. Maladie de décompression avec douleur seulement affectant le muscle orbiculaire des paupières. *Undersea Biomed Res* 1986; 13(4):461-463.—Un cas est rapporté d'un plongeur qui éprouva un début de douleur dans le muscle orbiculaire de la paupière gauche environ 20 min après le retour à la surface d'une plongée expérimentale. Un examen neurologique attentif ne révéla aucune anomalie. La réponse du muscle orbiculaire de la paupière à la stimulation du nerf facial et le réflexe de clignement étaient tous les deux normaux, tel qu'indiqué par un système d'enregistrement neurologique clinique. La douleur disparut rapidement avec la décompression, supportant le diagnostic de maladie de décompression avec peine seulement dans ce petit muscle facial.

maladie de décompression
réflexe de clignement
nerf facial

REFERENCE

1. Kimura J, Powers JM, Van Allen M. Reflex response of the orbicularis oculi muscle to supraorbital nerve stimulation: Study in normal subjects and in peripheral facial paralysis. *Arch Neurol* 1969; 21:193.